

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

**For: BIOLOGICAL DE-INKING METHOD**

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) Art Unit: 1731  
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) Examiner: Steve Alvo  
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**KARL-ERIK L. ERIKSSON, PH.D., declares as follows:**

3. I have read the English translation of Japanese Patent 59-9299 ('299 patent). In my expert opinion, the '299 patent, read in its entirety, teaches one of ordinary skill in the art only the successful use of deinking enzymes with alkaline deinking chemicals. It is my opinion that the data provided in the '299 patent, taken together with the knowledge of one skilled in the art prior to the priority date of the present application of May 16, 1989, does not provide an expectation for the successful use of enzymes for removing ink from pulp in a non-alkali

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environment, in particular at a pH of between about 3 to about 8.

4. This is true because the overall thrust of the '299 patent specification, and the evidence provided in all preferred embodiments and in all the Examples, refer to only alkaline deinking conditions. The statement on page 2, last full paragraph, to page 3, end of carryover paragraph, that

[a]ccordingly, this invention provides a de-inking agent for recycling old paper, containing cellulase. Cellulase commonly occurring in plants, animals, bacteria and fungi can be used in this invention without any special restriction, but alkaline cellulase is especially preferred. Alkaline cellulase is one having optimum pH 8.0 - 11.5 (preferably 8.1 - 11.0). Such enzyme retains its activity in the alkaline range as well as the acid or neutral range, e.g. a product purified and fractionated from cellulase culture liquid of various origins by salting out, precipitation, dialysis and gel fractionation . . .

refers to the conditions under which the enzyme may be purified, and does not suggest the use of the enzyme for deinking under non-alkaline conditions. Even if one were to interpret the statement to indicate the use of the enzyme under non-alkaline conditions, one skilled in the art would not have expected a successful result deinking under non-alkaline conditions, for the reasons described below. The only scientifically supported statements in the '299 patent are directed to the use of deinking enzymes in alkali conditions.

5. A possible reading of the '299 patent is that it is possible for cellulase enzymes to have activity at all pH ranges, but one skilled in the art at the time of this invention would not have tried to deink at a neutral pH, or non-alkaline conditions, because it was thought that alkaline conditions were required to achieve the swelling of the fibers necessary to remove the ink particles.

6. Before the description in the above-identified patent application, it was believed that alkaline conditions were necessary to cause ink containing paper fibers to swell to effect defiberization and deinking by enzymes. Absent alkaline conditions, one would not have expected swelling, and therefore deinking, to occur as a result of the addition of deinking enzymes alone in the pulping process. In the deinking art there is over twenty years of published detailed studies from commercial, academic and government laboratories that emphasize that chemical modification and treatment by alkali exposure is essential and necessary for deinking. As a recent example, enclosed is a copy of the Paper and Pulp

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International (PPI) publication entitled "Neutral Deinking Makes Its Debut," describing the breakthrough in October 1993 of deinking in neutral conditions, without the addition of alkalis such as sodium hydroxide to the pulp prior to or during deinking.

7. Therefore, to one skilled in the deinking art at the time the above-identified application was originally filed, the deinking action of enzymes in a non-alkaline medium would have been both novel and surprising. An expectation of the successful use of deinking enzymes in an aqueous medium having a pH of between about 3 to about 8 is not found in the '299 patent. It is my opinion that prior to the invention described in the above-identified patent application, no one skilled in the art would have considered evaluating deinking enzymes alone without the addition of alkalis.

8. In summary, it is my expert opinion that the disclosure of the '299 patent supports only the deinking of waste papers by the use of chemical alkaline deinking agents and cellulase, and does not provide a basis for the successful use of cellulase deinking enzyme in an aqueous medium having a pH of between about 3 to about 8 with an expectation of successful deinking of waste paper.

9. The undersigned declares that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements are made with the knowledge that willful false statements and the like are punishable by fine or imprisonment or both under 18 U.S.C. § 1001, and that such willful false statements may jeopardize the validity of the above-referenced application or any patent issuing thereon.

March 19, 2004  
DATE

Karl-Erik Eriksson  
KARL-ERIK L. ERIKSSON, PH.D.